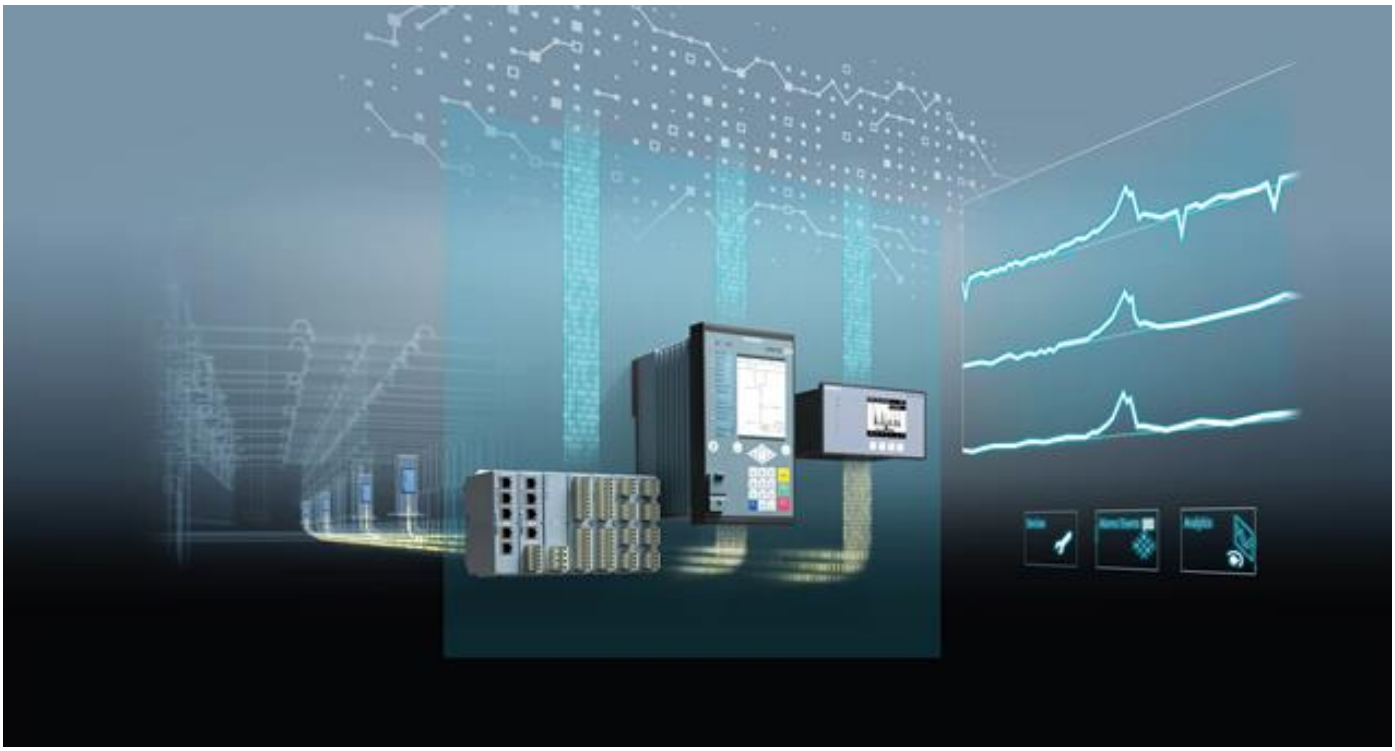

Retrofit for the future

Customized modernization for energy providers and industries

Switchboards are neuralgic points in a mains operation. The profitability of these systems lies within a limited range between the startup phase and ensuing age-related failures in the final phase of the product life cycle. That is why a suitable retrofit strategy is needed to lower life-cycle costs. Siemens offers a comprehensive service for this purpose. Based on the evaluation of a system, customized modernization plans are generated.

Energy providers and industrial enterprises alike depend on reliable technical infrastructure. Of all things, switchboards play a key role here, whether as the interface between various voltage levels or as the linchpin for energy infeed or generation.

Suitable retrofit measures

With increasing age, material fatigue impairs the functional safety of primary switching equipment. Yet unforeseeable failures also increase in secondary components, too. This can result in high overhead for repeated testing. With suitable retrofit measures, system operators can confront this risk. In doing so, they benefit from the advantages presented below.

High availability

Besides aging processes, it is above all the often uncertain spare parts supply that jeopardizes reliable system operation. With suitable retrofit measures, the clock, so to speak, is reset to zero. Not only is the aging process initially stopped. The registration of the new equipment in the course of digitalization also supports the procurement process and the management of spare parts. The overall result is increased system availability.

Efficient cost reduction

With modern digital protection, automation and power quality technologies, it is possible to record and analyze information that previously went untapped. This means that critical states can be detected early, countermeasures can be taken, and the operation as a whole can be optimized.

End-to-End Cyber Security

Cyber attacks happen again and again, where sensitive data is breached or unauthorized access to accounts is enabled. A secure operation ensures high availability. Integration processes and technical solutions must be based on international standards and provide for a future-driven, integrated solution with high availability.

Digitalization is a Trend

Retrofit opens up the possibility to spearhead digitalization of systems. Because the challenges for energy production, transmission and distribution may already be tremendously high today,

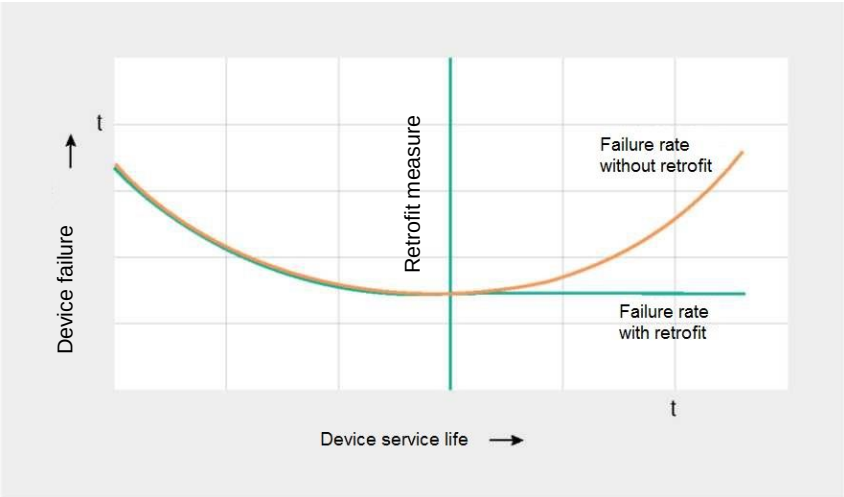

Figure 1. Graphic representation: Device failure in relation to device service life

Figure 2. Protection devices over the course of time

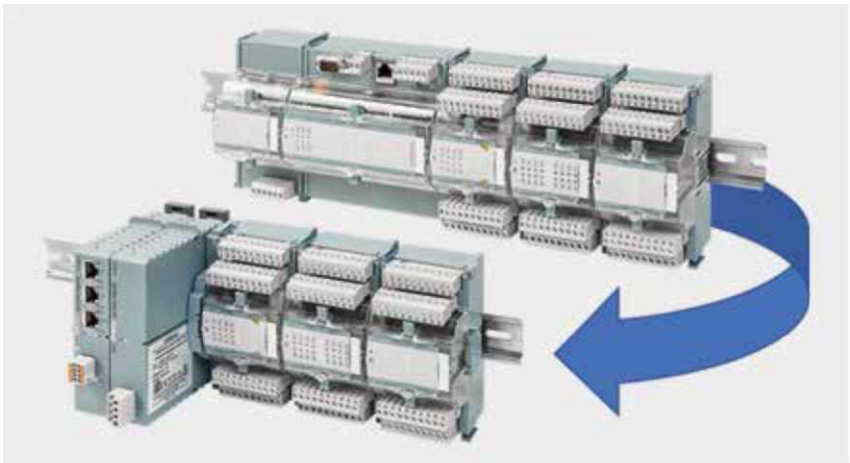

Figure 3. Retrofitting for remote terminal units (RTUs) - new processor module for effective cyber security

yet they will continue to increase even further in the future. The model up to now, in which electrical energy is produced centrally, is increasingly giving way to systems with numerous actors, as well as multiple layers of energy, information and financial streams. For network operators, this means that they need to adapt to new framework conditions and increasing complexity. More than ever, they rely on technical products, systems and solutions prepared to address these changes and which offer added value in the future. Only through increasing digitalization will it be possible to pro-actively tackle these challenges. In this, retrofit measures offer a grand opportunity to expand existing technical systems with intelligent solutions. The profitability of switchboards and their components lies within a limited range between the startup phase and ensuing age-related failures in the final phase of the lifecycle. Retrofit measures expand this range and thus lower the lifecycle costs **(Figure 1)**. Retrofit measures offer the following advantages for energy providers and energy users, but also for industrial customers:

- Higher productivity through higher network availability and reduction of sources of error
- Lower operating and production costs through efficient network automation
- Security by effectively fending off cyber attacks
- Energy transparency through measurement and evaluation of energy quality
- Preservation of evidence with legally actionable measured values

Security, efficiency, quality

Siemens offers a comprehensive retrofit service, in which the systems are evaluated, on the basis of which customized modernization plans are generated, meeting the relevant budget and business requirements. This also includes binding schedules to avoid network interruptions. Retrofit for individual components as an immediate measure is also possible, such as multi-year renewal programs as part of a long-term service agreement.

This service encompasses retrofit measures along the entire value-added chain, beginning with protection technology, through station control technology, right down to power quality solutions. In this, the products are regularly subjected to penetration tests, and along with software updates provide for the highest level of data protection and data security.

Protection technology you can rely on

For over 100 years, innovative protection technology from Siemens has stood for

reliable power supply as well as safe and efficient network operation **(Figure 2)**.
In many switchboards, decades-old protection technology is in operation, some of which borders on the far end of the product service life. In case of a sudden failure, the repair overhead for subsequent damage can be substantial. The costs quickly add up to a multiple of the retrofit measure. Self-monitoring during the exchange of data with control centers, rapid error resolution and reserve protection functions safeguard operations. As a result, Siemens devices reduce the complexity of a switchboard and thus also help to minimize the risk of errors through personnel.

In addition, the high sensitivity in error detection in combination with a short tripping time provides for increased system security. With the Siprotec 5, Siprotec Compact and Reyrolle devices, Siemens covers all areas, regardless of the protection function that is required. These compact devices offer functions, some of which used to require entire control cabinets. Plant operators thus benefit from a minimal footprint, reduced wiring and low cabling costs. Thanks to the use of fiber optics, electromagnetic interference can also be avoided.

Station control technology that thinks on its feet

The products and solutions are prepared for setting up new maintenance-friendly station control technology without major overhead, even in extremely heterogeneous systems. The architecture of the Sicam station control technology is fully integrated and provides for a substantial improvement in flexibility. The retrofit range from Siemens boosts the potential of the entire system – from single-user control on site, right down to redundant multi-server, multi-user systems – for efficient automation, operation, monitoring and archiving.
As open as station control technology needs to be for the connected devices, it also needs to be hermetically secured from the outside against unauthorized access. As with all retrofit measures, this is achieved by applying the latest cyber security standards. This is demonstrated below using an example of retrofit measures in tele-control technology **(Figure 3)**.

Secure and fast communication of remote terminal units (RTUs) is essential to guaranteeing a secure and reliable electrical energy system in today's challenging complex electrical networks. SICAM A8000 offers the possibility of using the benefits of the new IP technology while ensuring compliance with all relevant IT security measures. Here's the major advantage: Existing components from the Sicam MIC series and TM1703 MIC respectively can be integrated into the system. You just have to replace the master control and power supply module of the existing RTU with the new SICAM 8000 CP and PS modules – all other components remain the same. This enables the system to be integrated into the IT network without major overhead and by doing so, providing the best possible safeguard against cyber attacks. Free firmware updates ensure that the system is always up-to-date regarding cyber security.

Power quality that pays off

Regardless of whether it involves energy producers with renewable energy plants or conventional power plants, network operators, as well as users in the sense of industry and IT companies: problems with network quality affect everyone. Inadequate voltage quality impairs roduction and reduces competitiveness. In the worst case, it can lead directly to damage and malfunctions. With the Sicam power quality solutions, all critical interferences can be identified. Thus, it is possible, even with a small investment, to secure the availability and efficiency of plants and machinery.

One example of this is the use of the Sicam Q200 power quality recorder for inspecting supply quality **(Figure 4)**. It is a network analyzer for detecting and evaluating network quality and electrical energy supply networks also offers special algorithms and functions for power management applications. This device supports continuous acquisition and analysis of all relevant parameters. The results help define and implement adequate measures to safeguard supply quality. This increases the service life of equipment – while at the same time reducing downtimes.

Customized modernization from a single source

Each retrofit measure is individual. That is why the characteristic data of an existing system is analyzed with the concrete requirements, resulting in an individual bundle of measures – including device selection, system planning and financing.

This methodology ensures the achievement of a quick, operation-ready solution and a reduction of the amortization period. Depending upon the measure, modernization is also possible during ongoing operation. Moreover, Siemens handles the training of employees on the new devices and, where necessary, also guides them above and beyond the commission.

Figure 4. PQ-device Class A for high-definition recording and evaluation of power quality in electrical power supply systems

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